PHYSICS

Fusion Control Closer

"Burnout," an important step toward the goal of unlimited electrical energy from controlled hydrogen bomb reactions, has been achieved in experiments—By Ann Ewing

➤ SCIENCE HAS TAKEN another, large step toward controlling hydrogen bomb reactions for peaceful purposes to provide unlimited electrical energy.

The important step was taken by two scientists at Oak Ridge National Laboratory, Oak Ridge, Tenn., who for the first time achieved what is called "burnout" in laboratory experiments. The goal of harnessing fusion for power is still in the future, however.

Burnout occurs when the energy input through the plasma is sufficient to ionize all the background of neutral gas. When this has happened, the "environment for carrying out thermonuclear reactions" is excellent, Drs. Igor Alexeff and R. V. Neidigh reported in Physical Review Letters, 13:179, 1964.

Achieving burnout means that it is only a matter of time, although possibly a long time, before "burnout" can be observed in larger machines, such as the DCX, the Oak Ridge device aimed at taming fusion reactions.

To control thermonuclear reactions in the laboratory requires producing a hot plasma, or ionized gas, then confining it sufficiently long for fusion to occur. Temperatures required are some 100 million degrees, so only a "magnetic bottle" can contain the reactions.

Many different laboratories, both here and abroad, are using varying approaches to meet these stringent requirements. However, the concept of burnout is essential to any of the approaches depending on a "steady state."

The important fact is that until now, no one knew for sure whether burnout could be reached or not. Now that it is known burnout can be achieved under certain circumstances, scientists have more confidence that it can be achieved under others.

And that gives them a better foundation than before for looking toward the day when controlled thermonuclear reactions can be self-sustaining, with more energy being released than is used to start the fusion.

• Science News Letter, 86:115 Aug. 22, 1964

METEOROLOGY

Seeded Clouds 'Explode'

Cloud seeding experiments with silver iodide, resulting in "explosions" that release tremendous energies, indicate that weathermen may do more than predict weather in the future.

➤ TROPICAL CLOUDS "explode" when sprinkled with silver iodide.

The explosion is first upward, then sideward. The horizontal spread is likely to prove the "most significant" for practical weather modification, two scientists reported.

The horizontal explosion in the Caribbean clouds released additional energy equal to that of one or two Hiroshima bombs, which were equivalent to 20,000 tons of TNT apiece.

One giant tropical cloud releases, in heat of condensation, as much energy as several Hiroshima bombs. The additional energy obtained by seeding is considered quite a return for 66 pounds of silver iodide.

Dr. Joanne Malkus, meteorology professor at the University of California, Los Angeles, and Dr. Robert H. Simpson of the U.S. Weather Bureau called the sideward explosion of seeded clouds "quite unexpected."

Four of six clouds sprinkled with silver iodide in the tropics a year ago behaved in this "abnormal and spectacular" fashion, observations showed. Drs. Malkus and Simpson have now completed their analysis of the 1963 Caribbean cloud seeding experiments. Their report is in Science, 145:541, 1964.

The experiment, the scientists agree, would not have been possible without the precision flying of five U.S. Navy planes whose flight paths through the clouds were carefully coordinated by Navy Capt. Max Eaton from a command aircraft.

Near-perfect timing prevented the seeding experiment from remaining a "theoretical meteorologist's daydream and a practical meteorologist's nightmare."

Follow-up tests are not being made this year because of "lack of supporting facilities," SCIENCE SERVICE learned.

The scientists likened tropical cumulus clouds to people because they also go through a life cycle—they are born, grow to maturity, age and die. However, this seeding experiment shows that, unlike people, the fatter the clouds are, the longer they live, and the taller they grow.

Thus the importance of the upward, then sideward growth in tropical clouds, since giant clouds are the combustion cylinders in hurricanes.

"The important conclusion," Drs. Malkus and Simpson stressed, is that an experiment of seeding clouds with measurable results can be made. Now, they said, "a real atmospheric phenomenon is at last subject to a relatively controlled and theoretically modeled experiment.

"It has long been deplored that the earth sciences, in contrast to physics, must be observational rather than experimental sciences.

"Here meteorology is taking the first small steps toward becoming an experimental science, which it must become if man is ever to exert real control on this atmosphere.

"Fortunately the first step has been made with cumulus clouds. These are of vital importance to man in themselves, a key part of the larger scale atmospheric machinery, and a prototype of the widespread geophysical phenomenon of thermal convection," they concluded.

• Science News Letter, 86:115 Aug. 22, 1964

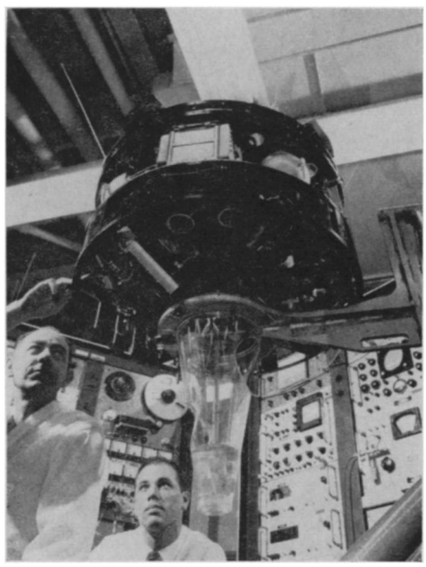
GEOLOGY

Prehistoric Geography Paralleled in East Asia

➤ BETWEEN 200 and 500 million years ago, the geography of eastern North America was similar to that of eastern Asia of today. It had bordering seas and islands like Japan's, with earthquake-prone, volcano-topped arcs.

This prehistoric setting is described in a report to the Washington Academy of Sciences by H. W. Coulter and G. V. Carroll of the U.S. Geological Survey.

• Science News Letter, 86:115 Aug. 22, 1964



NASA

SPACE CORRESPONDENT — Syncom C, the spacecraft designed to use several communication media, is inspected by Joseph Stockel (r.), space agency engineer from Goddard Space Flight Center, and Herschel Huffman (l.), Hughes Aircraft Company technician, prior to delivery to the National Aeronautics and Space Administration.